

Sub 1 We claim:

1. A clamp comprising:

a saddle member having a concave saddle portion;

a U-bolt mounted on the saddle member, the U-bolt having a concave portion oriented opposed to the saddle member concave saddle portion; and

a first shim positioned between the U-bolt and the saddle member.

2. The clamp of claim 1, wherein the first shim has a width that is greater than a width of the U-bolt.

3. The clamp of claim 2, wherein the width of the first shim is at least one and a half times the width of the U-bolt.

4. The clamp of claim 1, wherein the first shim has a generally rectangular cross-section.

5. The clamp of claim 1, wherein the first shim is arranged and configured to separate the U-bolt and saddle member form a structure desired to be clamped.

6. The clamp of claim 5, wherein the U-bolt and saddle member are zinc-plated, and the first shim is made of aluminized steel.

Sub 2 7. The clamp of claim 1, wherein the saddle member comprises a double saddle.

8. The clamp of claim 1, wherein the first shim comprises a first curved shim secured to the saddle member concave saddle portion, and the clamp also includes a second curved shim secured to the U-bolt concave portion, the first curved shim having a concave side opposed to a concave side of the second curved shim.

9. The clamp of claim 8, wherein the first curved shim is secured to the saddle member by a snap-fit connection.

10. The clamp of claim 9, wherein the first curved shim includes a curved central portion and two retaining ears projection outward from opposite ends of the curved central portion, the retaining ears defining openings arranged and configured for receiving U-bolt legs of the U-bolt.

11. The clamp of claim 10, wherein the retaining ears define channels arranged and configured for receiving saddle legs of the saddle member, and the snap fit connection is provided between the retaining ears and the saddle legs.

12. The clamp of claim 8, wherein the saddle member is formed by two opposing spaced-apart saddle plates, and the first curved shim includes at least one shim projection that extends between the saddle plates to limit movement and provide alignment between the saddle member and the first curved shim.

13. The clamp of claim 8, wherein the second curved shim is secured to the U-bolt by a snap-fit connection.

14. The clamp of claim 13, wherein the U-bolt includes two opposing projections that extend inward from legs of the U-bolt, the projections being arranged and configured to provide the snap-fit connection with the second curved shim.

15. The clamp of claim 13, wherein the U-bolt includes two opposing notches defined by spaced-apart legs of the U-bolt, the notches being arranged and configured to provide the snap-fit connection with the second curved shim.

16. The clamp of claim 8, wherein the second curved shim includes a curved central portion and two flanges projecting transversely outward from the central portion, the flanges each being

generally L-shaped and each having an opening arranged and configured for receiving a leg of the U-bolt.

17. An exhaust system comprising:

at least one exhaust pipe; and

a clamp mounted on the exhaust pipe, the clamp including a U-bolt secured to a saddle member, the clamp also including at least one shim constructed and arranged to separate and insulate the U-bolt and the saddle member from the exhaust pipe.

18. The system of claim 17, wherein the at least one exhaust pipe includes two exhaust pipes that overlap one another at a lap joint, and wherein the shim is arranged and configured to completely cover deformation openings defined by at least one of the two exhaust pipes such that the lap joint is both sealed and clamped.

19. A method for sealing a lap joint formed between two pipes, the method comprising the steps of:

providing a clamp including a U-bolt and a saddle member;

capturing the two pipes between the U-bolt and the saddle member;

orienting at least one curved shim between the two pipes and both the U-bolt and the saddle member, such that both the U-bolt and the saddle member are separated from the two pipes;

orienting the shim such that the shim covers take-up openings defined by at least one of the pipes; and

compressing the shim against the pipes by drawing the U-bolt towards the saddle member, wherein as the shim is compressed against the pipes, the shim causes the lap joint to be both sealed and clamped.

20. The method of claim 19, further comprising the step of connecting the U-bolt to a mounting bracket secured to a vehicle.

¹⁷ 21. The clamp of claim 8, wherein the U-bolt includes an alignment projection that fits within a recess defined by the second curved shim.

¹⁸ 22. The clamp of claim ¹⁷21, wherein the U-bolt includes a flattened region positioned opposite from the alignment projection.

¹⁹ 23. The clamp of claim ¹⁸22, wherein the U-bolt and the second curved shim are projection-welded together.

²⁰ 24. The clamp of claim 8, wherein the first curved shim includes radial ears that straddle the saddle member.

²¹ 25. The clamp of claim ²⁰24, wherein the saddle member includes tabs that mechanically interfere with the radial ears to retain the first curved shim on the saddle member.

²² 26. The clamp of claim 8, wherein the saddle member includes opposing front and back walls, and reinforcing end walls aligned at right angles with respect to the front and back walls.

²³ 27. The clamp of claim ²²26, wherein the front and back walls have oppositely disposed ends, and each end is substantially closed by a pair of the reinforcing end walls.

²⁴ 28. The clamp of claim ²³27, wherein each pair of end walls defines a tapered gap thereinbetween.

²⁵ 29. The clamp of claim 1, wherein the saddle member includes opposing, spaced-apart front and back walls, between which legs of the U-bolt are inserted.

²⁶ 30. The clamp of claim ²⁵29, further including opposing projections that project inward from the front and back walls for reducing play between the saddle member and the U-bolt.